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"Pipe Insert"

Field of the Invention

The present invention relates to a pipe insert and also to a method of connecting at least two pipe ends using such a pipe insert.

Background

Process piping installations are common to many industries, including the oil and gas, petrochemical and mining industries.

A requirement associated with most major projects concerning such installations is that the piping be hydrostatically and/or pneumatically tested, prior to pre-commissioning, so as to ensure conformity with design and operating parameters. Such testing is generally followed by a cleaning phase which may involve subsonic air blasting. Until the installation is commissioned, it is not desirable to expose control elements, such as valves and like elements, to the rigours that will be experienced during assembly of the installation, cleaning of the assembled installation and testing of the installation prior to commissioning. Throughout the specification and claims the term "appliance" shall be taken as referring to control elements, such as valves, gauges, flow restrictors and like elements, which are installed in a fluid line in order to control and/or monitor the fluid flow through fluid line.

For this reason, it is not uncommon for such control elements to be installed and then removed as many as three times over the course of construction, testing and cleaning. This generally involves construction of purpose-built temporary pipe inserts to replace each control element. In installations which incorporate tens or hundreds of control elements, this practice is unwieldy and wasteful because, in most instances, a new pipe insert is created each time for each control element and, where the installation is to be subjected to testing, each temporary insert must be fabricated to the same standards as the control element which it is intended to replace. Associated shortcomings in this regard include triple-

handling and installation, which compromises the mechanical integrity of the pipe system, as well as the need to subject the temporary inserts to non-destructive testing to ensure their fitness for use during testing and cleaning. This results in unnecessary expense, time delays and safety risks. In addition, there is an increased likelihood of damage to the control elements each time they are installed and then removed.

Disclosure of the Invention

Throughout the specification and claims, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

According to one aspect of the present invention, there is provided a pipe insert which in use is to provide a connection between at least two spaced pipe ends which are fixed relative to each other, said pipe ends each having first connection means enabling the connection of an appliance between the pipe ends, the insert in use being intended to replace the appliance and provide a fluid tight interconnection with each end, the insert having at least two ends, the pipe insert being adjustable to be able to vary the relative displacement between the ends, each end having second connecting means adapted in use to be sealing interconnected with the first connecting means.

According to a preferred feature of the invention the pipe insert is able to accommodate at least some of the intended fluid flow between the pipe ends. According to a preferred feature of the invention the pipe insert constitutes a flow conduit between the ends. According to one embodiment the flow conduit comprises an integral part of the pipe insert. According to another embodiment the flow conduit is of a flexible or extendable nature.

According to a preferred feature of the invention the pipe insert is adapted to receive at least one of a selection of flow control and/or sensing elements.

According to a preferred feature of the invention wherein the pipe insert incorporates a flow control and/or sensing elements.

According to a preferred feature of the invention the pipe insert is not able to accommodate flow between the pipe ends.

According to a preferred feature of the invention the pipe insert comprises a plurality of interengaged sections which are displaceable relative to each other to vary the relative displacement between the ends of the insert, and a sealing and locking means is provided between the sections, said locking means being capable of being released to permit relative longitudinal movement between the sections.

According to a preferred feature of the invention insert wherein the sections accommodate for fluid flow between the flanges and are sealingly interconnected.

According to a preferred feature of the invention the sections are telescopingly interengaged.

According to a preferred feature of the invention the sections are threadably interengaged, whereby the relative displacement is varied by varying the relative longitudinal position of the threadable interconnection between the sections.

According to a preferred feature of the invention the second connecting means are removable from the ends and the second connecting means which are to affixed to the ends can be are selectable from a plurality of differing forms of second connecting means adapted to conform with the first connecting means of the pipe ends of differing sizes.

According to a preferred feature of the invention the first connecting means each comprise a flange at the respective pipe end and said second connecting means each comprise a flange at the respective end wherein the first and second connecting means are of a complementary form.

According to a preferred feature of the invention the ends of the insert are displaceable along a common axis.

According to a preferred feature of the invention the ends of the insert are displaceable along at least two axes which are angularly displaced from each other.

According to a preferred feature of the invention are displaceable along two axes which are substantially perpendicular to each other.

According to a preferred feature of the invention the ends of the insert are displaceable along at least two axes which are spaced from each other.

According to a preferred feature of the invention the pipe insert is able to accommodate the flow and pressure conditions anticipated for the appliance in use.

According to a preferred feature of the invention the pipe insert is configured and such that it can accommodate the anticipated mechanical loadings anticipated to be applied to the appliance in use.

According to one aspect of the present invention, there is provided a method of connecting at least two spaced pipe ends which are fixed relative to each other, said pipe ends each having first connection means enabling the connection of an appliance between the pipe ends, the method comprising the steps of:

providing an insert of the form as claimed at any one of the preceding claims between the at least two spaced pipe ends;

adjusting the length of insert to cause relative displacement between the ends of the insert according to the spacing between the pipe ends;

inserting the inset into the space between the pipe ends; and

connecting the insert to the pipe ends with the abutting first and second connecting means to provide a fluid tight interconnection therebetween.

The invention will be more fully understood in the light of the following description of specific embodiments.

Brief Description of the Drawings

The description is made with reference to the accompanying drawings of which:

supported by the outer radial face of the flange for sealing engagement with the inner bore of the larger section 102. Because of the telescoping nature of the connection sections 101 and 102 the length of the pipe insert can be varied as required. The annular seal cover 104 also serves as a locking means which is able to resist relative longitudinal movement between the sections when it is tightly engaged when it is tightened.

There exist further embodiments wherein the number of outer sections provided to each side differs from that in connection with the first and second embodiments. Moreover, it will be appreciated that the number of outer sections provided to one side of the central section may differ from the number provided to the other side.

Other embodiments exist wherein there is a transverse offset between the outer section(s) to one side of the central section and the outer section(s) to the other side of the central section to accommodate for circumstances where the pipe ends are out of coaxial alignment.

In addition, there exist alternative embodiments which are adapted to connect more than two pipe ends, for example inserts formed as tee-pieces or four-way pieces, those inserts being adjustable in some or all longitudinal axes, so as to vary the positions of the connectors according to the spacing of the pipe ends.

A further embodiment as shown schematically at Figure 7 comprises a situation where the pipe insert does not need to provide fluid communication between the pipe ends during the period of time that the pipe insert is to be in position between the pipe ends. As a result portion 210 between the flanges 212 comprises a member which is extendible and which has sufficient structural integrity to withstand the forces exerted thereon during the relevant activity.

A further embodiment as shown schematically at Figure 8 comprises a situation where the portion 310 of the pipe insert between the flanges does not provide full fluid communication between the pipe ends during the period of time that the pipe insert is to be in position between the pipe ends. As a result portion 310 between

the flanges 312 comprises a member which is extendible and which has sufficient structural integrity to withstand the forces exerted thereon during the relevant activity. To accommodate for the required fluid flow a flexible flow line 308